Abdominal Injuries

Chapter 17: Abdominal Injuries

Chapter 18: Genitourinary Tract Injuries

Chapter 19: Gynecologic Trauma and Emergencies

Learning Objectives

- Identify the indications for laparotomy on the battlefield
- Apply the FAST exam in the evaluation of the combat casualty
- Discuss the management of injuries to the GI tract, GU tract, abdominal solid organs and abdominal vasculature

Laparotomy Indications

- Penetrating truncal injuries:
  - Below the nipples
  - Above the symphysis pubis
  - Between the posterior axillary lines
  - Clinical signs/symptoms of intraperitoneal injury
- Blunt abdominal injuries
  - Presenting in shock
  - Positive FAST/DPL

Deferred Laparotomy

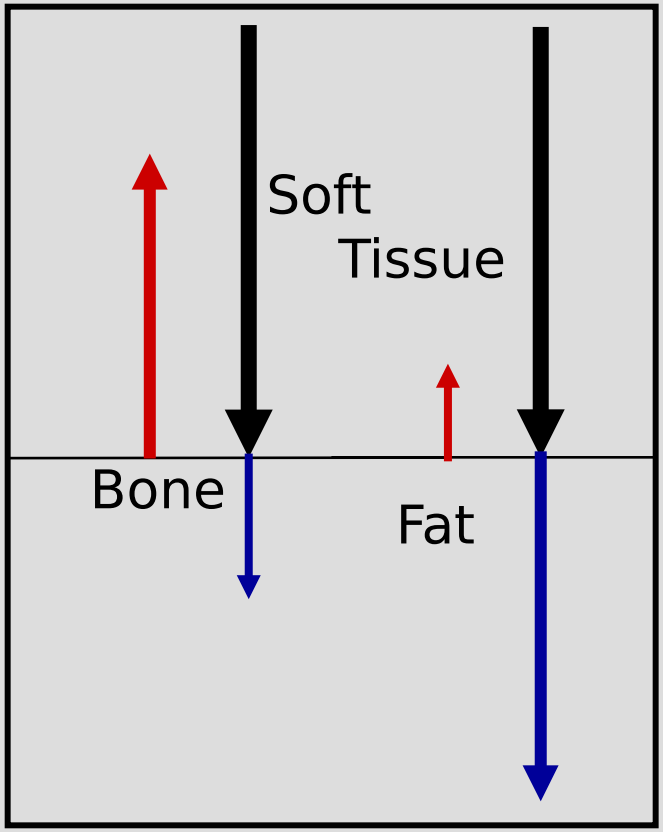
- Stable patients with peritoneal injury (up to 6 hrs)
  - Controlled initial resuscitation
  - Antibiotics and monitoring
  - Transport to next level of care for surgery
- Transfer directly to Level III when:
  - Tactical situation permits
  - Aeromedical evacuation readily available
  - Short evacuation time

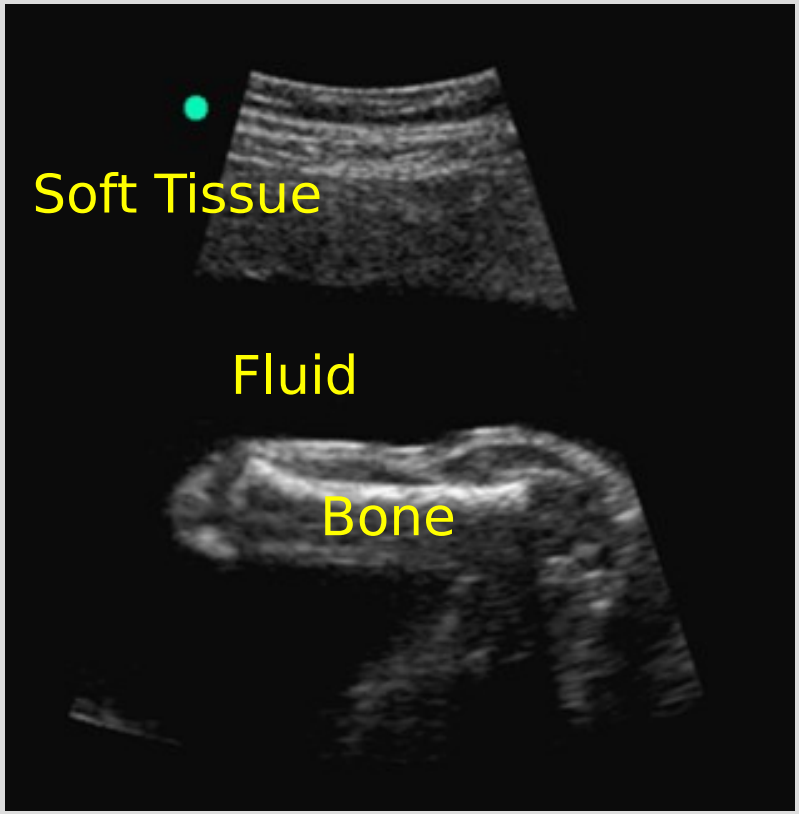
Diagnostic Adjuncts

Ultrasound	DPL	CT	
Sensitivity %	60 - 100	88 - 99	74 - 96
Sensitivity %	60 - 100	88 - 100	98 - 99
Time (minutes)	2 - 5	10 - 12	30 - 40

Basic Ultrasound

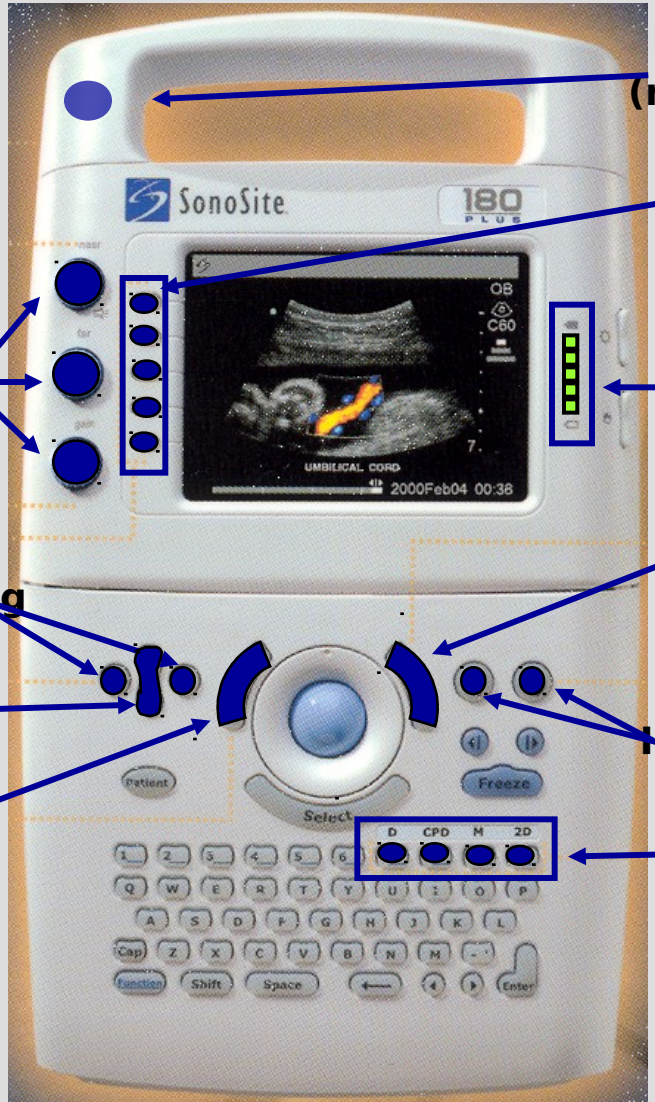
- Waves reflect off tissue interfaces & form an image





Sonosite®

- Weighs 5.7lbs
- Battery or AC
- Doppler
- M-mode
- Fast boot up
  - Ready to scan in under 10 seconds



FAST
Focused Abdominal Sonography for Trauma

- Extension of Physical Examination
  - Real time, repeatable
- Identifies significant intraperitoneal & pericardial fluid
  - Does not identify specific injury
  - Does not characterize fluid
- No evaluation of retroperitoneum
- Most useful in blunt trauma

Basic Views

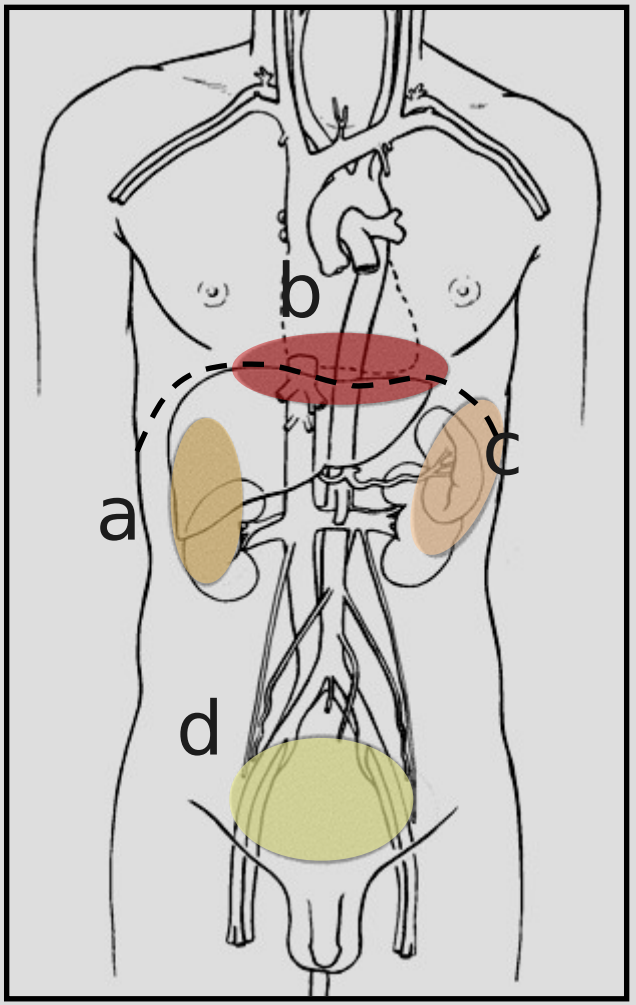
4 basic probe placements

a - RUQ (Morrison's pouch)

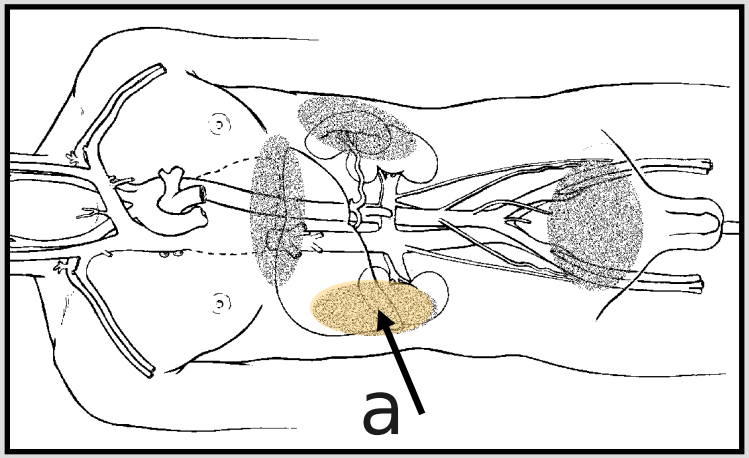
b - Cardiac

c - LUQ (splenal-renal reflection)

d - Pelvic



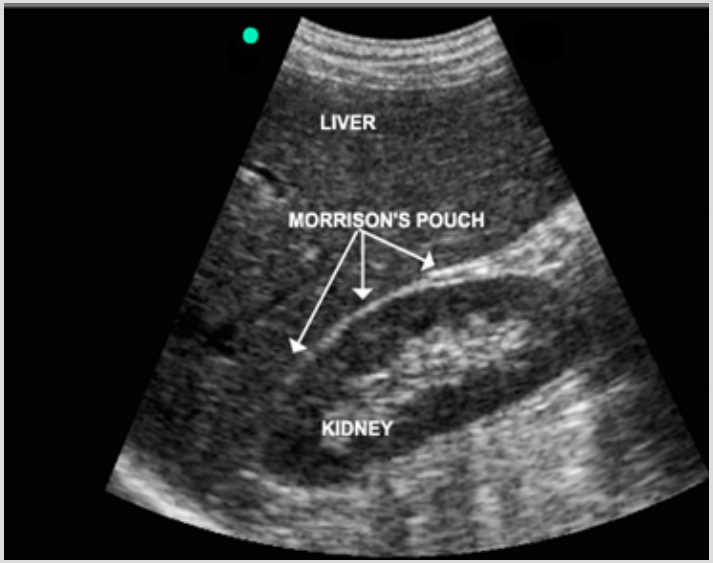
FAST: Right Upper Quadrant



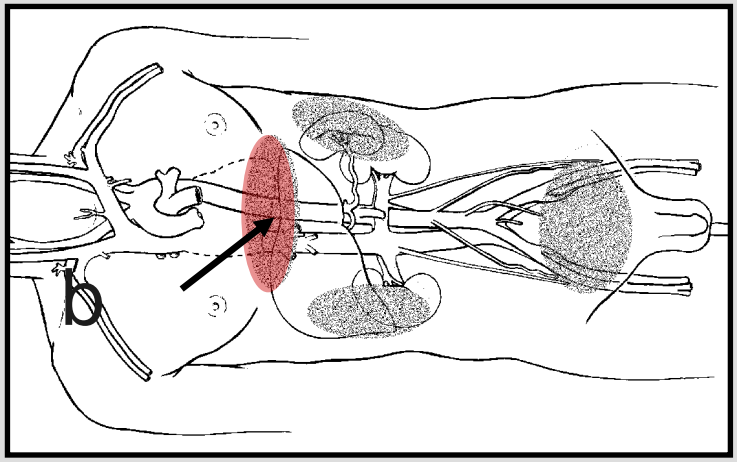
Normal

Movie Clip

Abnormal



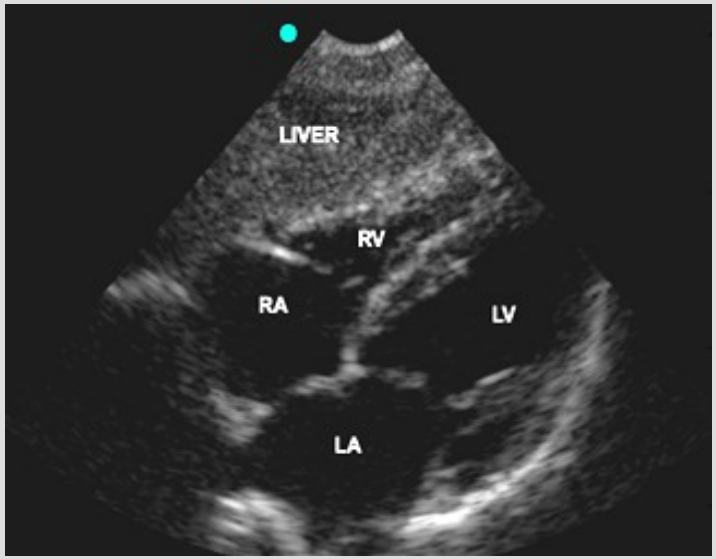
FAST: Cardiac View

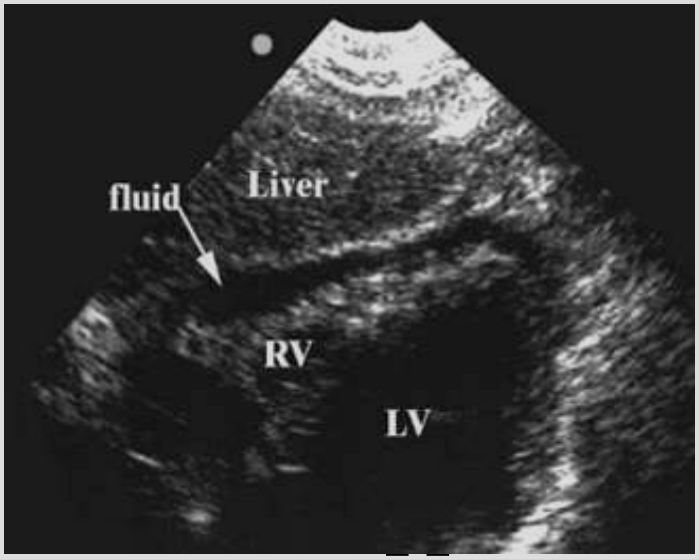


Normal

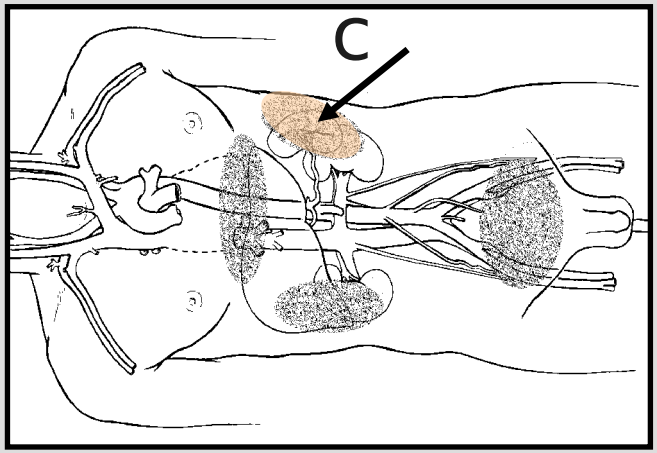
Abnormal

Video Clip



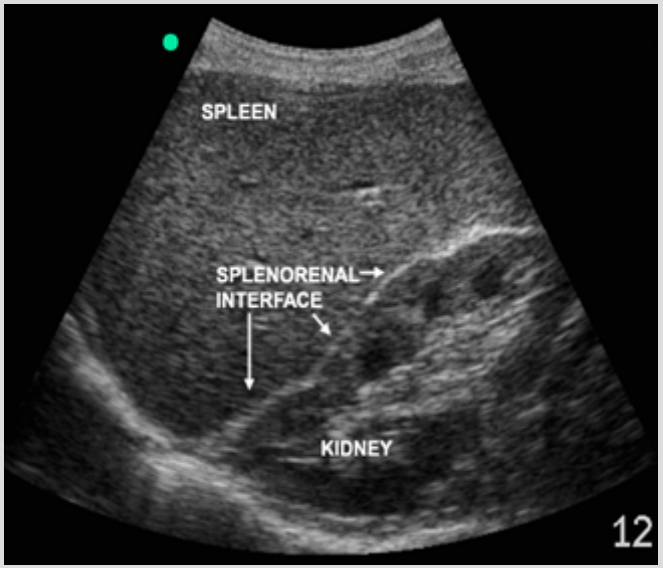


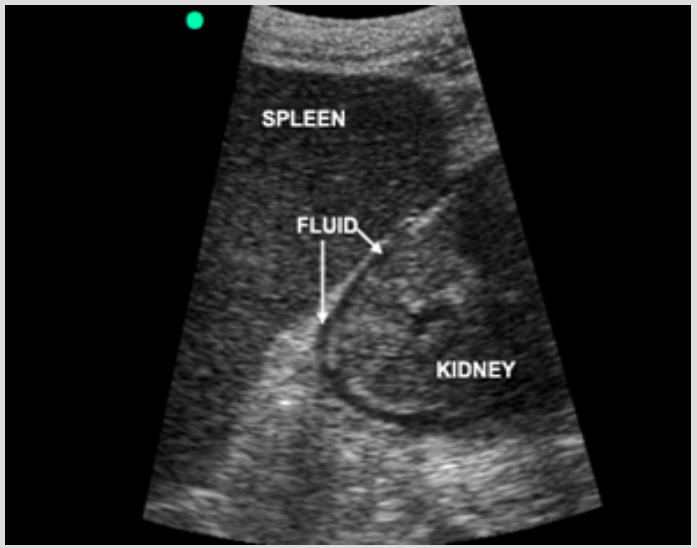
FAST: Left Upper Quadrant



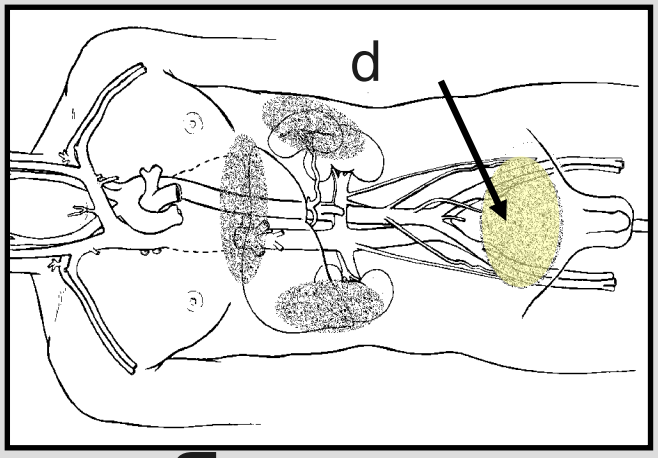
Normal

Abnormal



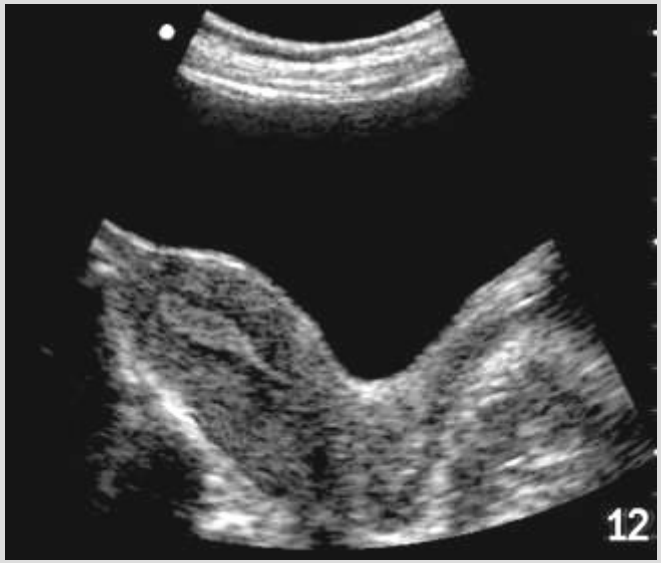


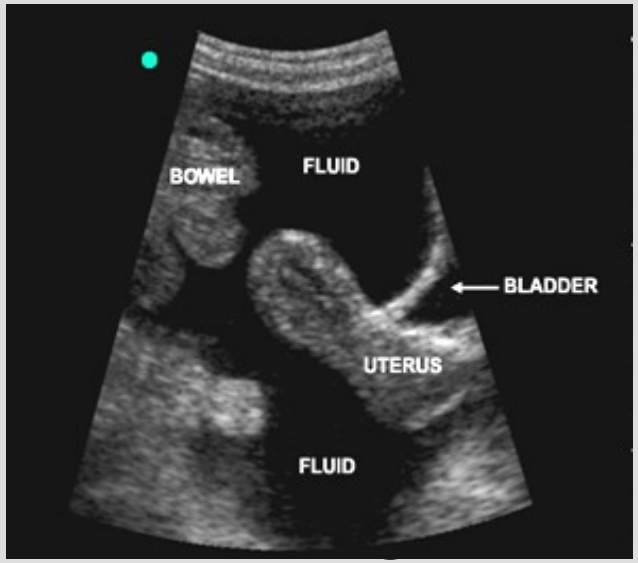
FAST: Pelvic View



Normal

Abnormal





Diagnostic Peritoneal Tap

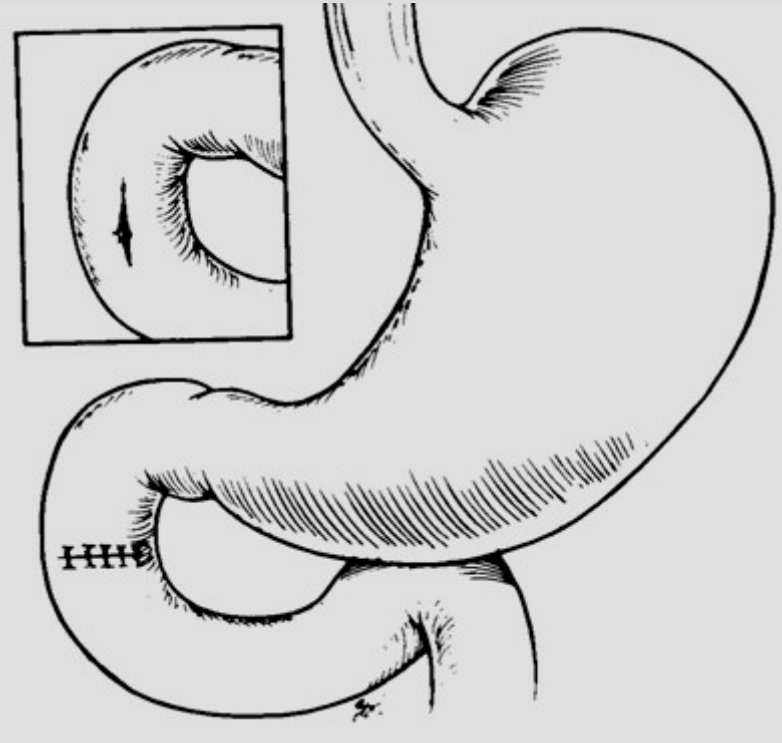
- Defines presence & character of intraperitoneal fluid
- Positive tap
  - 10cc gross blood
  - Enteric contents
- Option if FAST not available

Stomach Injuries

- Explore anterior and posterior walls
- Debride and close primarily
- Visualize GE junction

Duodenal Injuries

- Mobilize with full Kocher/Cattell maneuver
- Ascertain relationshi to ampulla and duct
- Primary repair
  - <50% circumference without tissue loss

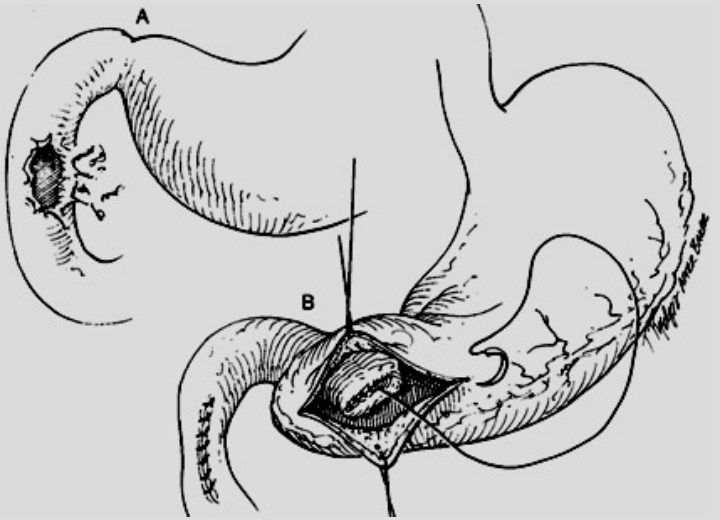


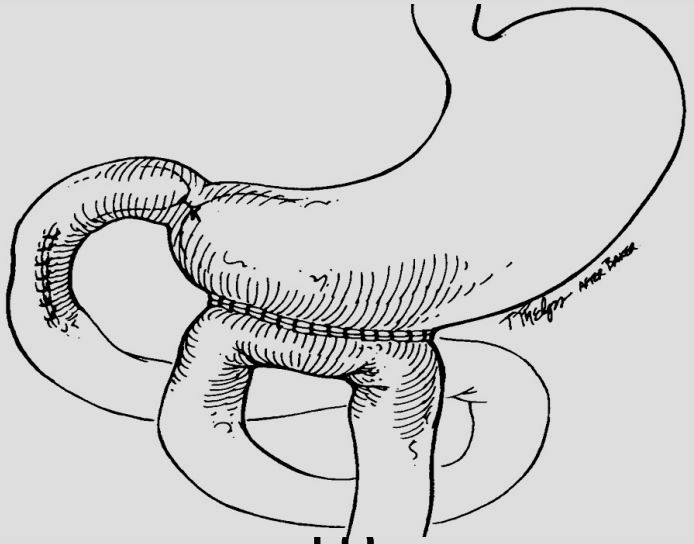
For > 50% Circumference
With Tissue Loss

- Consider damage control with
  - Tube duodenostomy
  - Peri duodenal drainage
  - Packing
- Consider definitive repair ≥ Level III
  - Roux-en-Y
  - Jejunal-serosal repair
- Wide drainage with closed suction drains

Duodenal Injuries

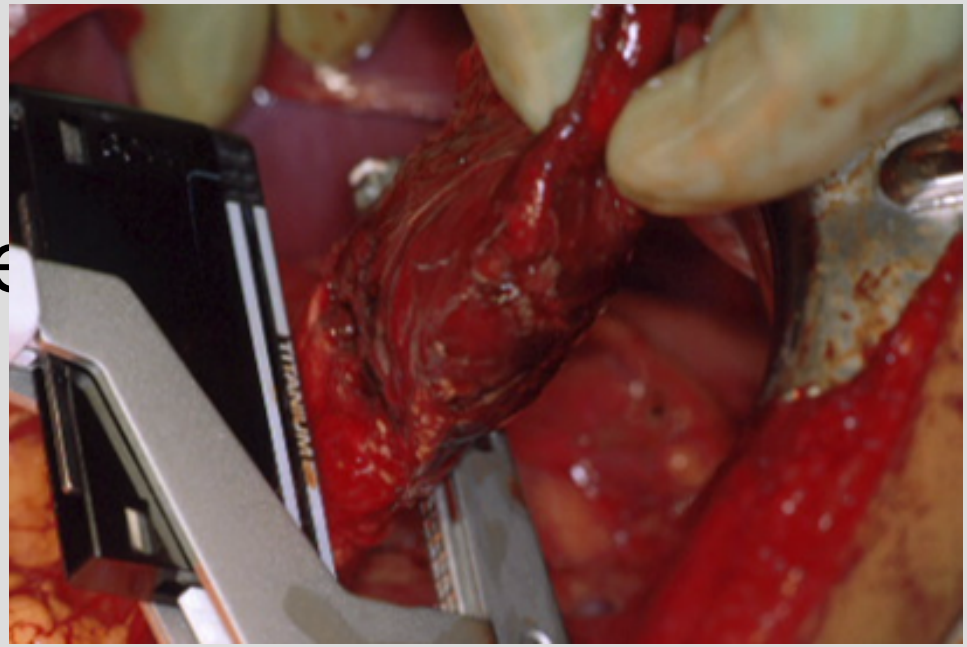
- Protect definitive repa
- Procedure
  - Pyloric closure
    - » Ligate with 0 suture
    - » Use noncutting stapler
  - Gastrostomy tube vs. gastrojejunostomy
  - Feeding jejunostomy





Pancreas Injuries

- Open lesser sac
- Kocher maneuve
- Define injury
  - R/L of spine
- Resect injury to left of spine
  - No role for splenic preservation
- Drain injury to right of spine



Pancreas Injuries

PANCREATICODUODENECTOMY
NOT INDICATED
IN AUSTERE ENVIRONMENTS

but

Treat with the principles of Damage Control:

DRAIN, DRAIN, DRAIN!

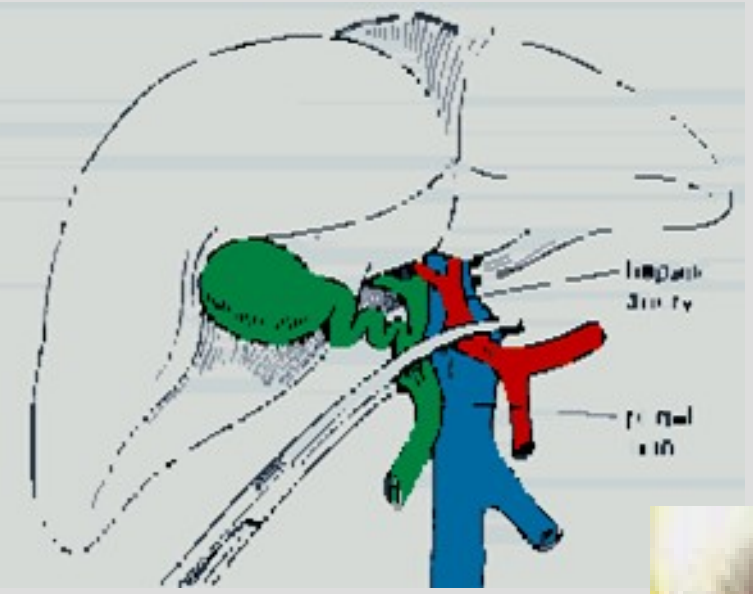
Interrogation of the Duct

- If duct injury in question, consider
  - Needle cholecystocholangiogram
  - Butterfly choledochocholangiogram

Liver Injuries

- Fully mobilize liver
- Apply damage control techniques early
  - Prevent coagulopathy, hypothermia, acidosis
- Perihepatic packing
- Pringle maneuver to control hepatic inflow
- Surgical resection discouraged
- Closed suction drainage

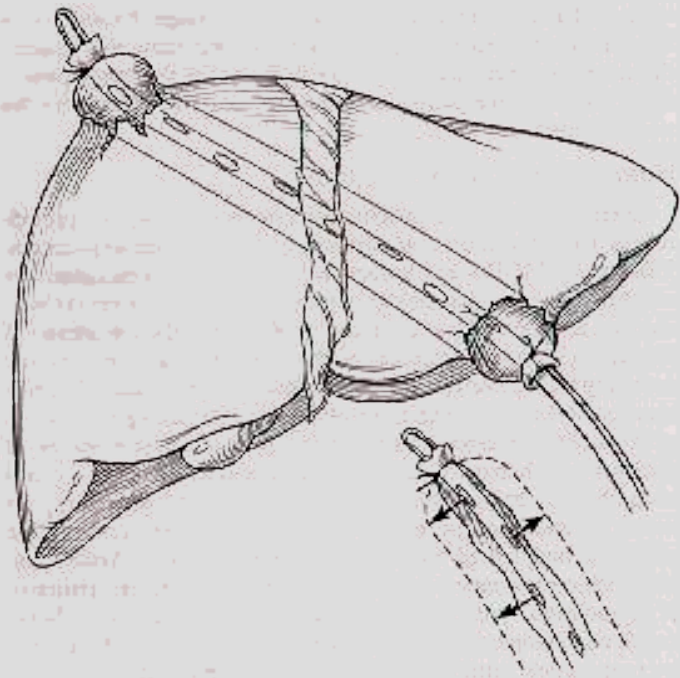
Liver Injury - Adjuncts



Hepatic Inflow Occlusion

(Pringle Maneuver)

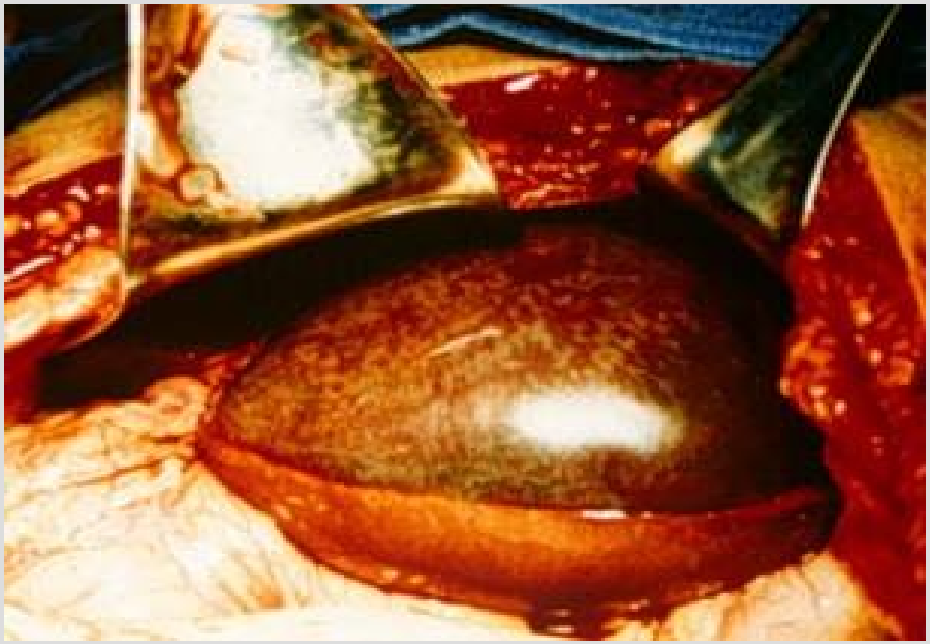
Omental Packing



Balloon Tamponade

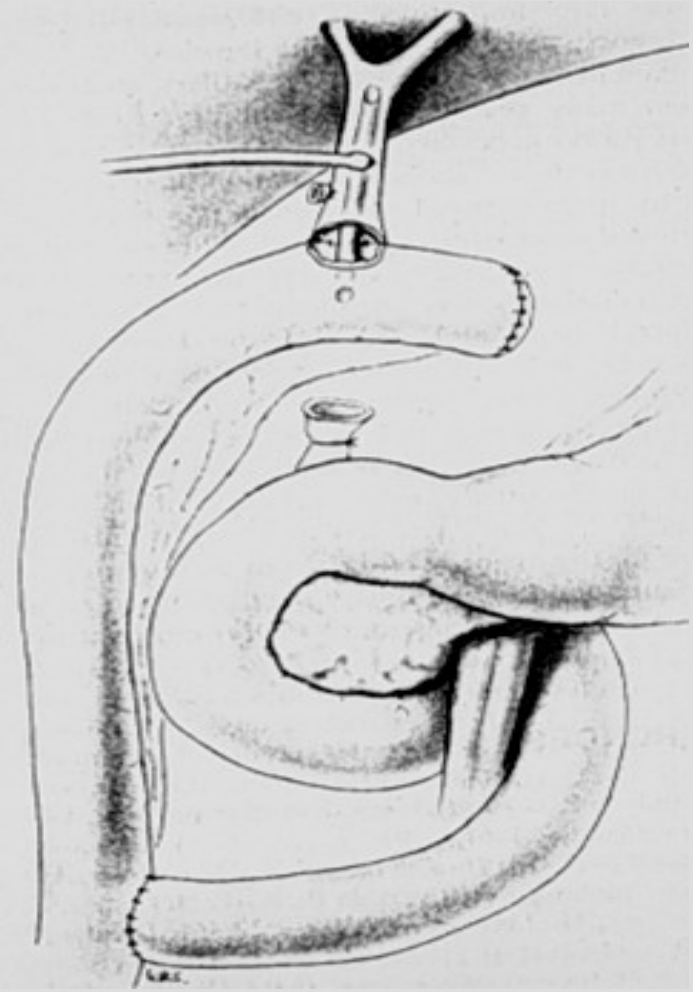
Subcapsular & Hepatic Hematomas

- Leave alone if hemodynamically stable
- Pack if expanding or unstable
- Avoid “unroofing” hematoma



Biliary Tract Injuries

- Gallbladder
  - Cholecystectomy
- Bile duct
  - < 50% circumference
    - Repair over T-tube
  - > 50% circumference or segmental loss
    - Choledochoenterostomy
    - Tube choledochostomy
  - Wide drainage

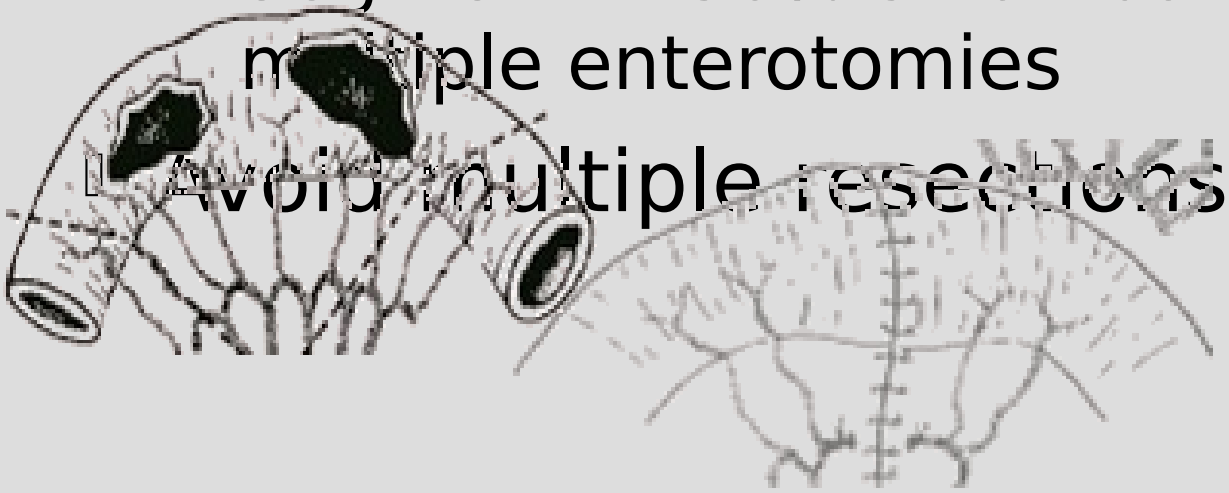


Splenic Injuries

- Splenectomy
  - No role for splenic salvage
- No drains
- Explore for associated diaphragm, stomach, pancreatic, and renal injuries
- Immunizations (post-op)
  - Pneumococcal
  - Haemophilus Influenza
  - Meningococcal

Small-Bowel Injuries

- Close enterotomies in one or two layers
  - Skin stapler is a rapid alternative
- Single resection with primary anastomosis
  - Segment < 50% small-bowel, multiple enterotomies
- Avoid multiple resections



Colon Injury

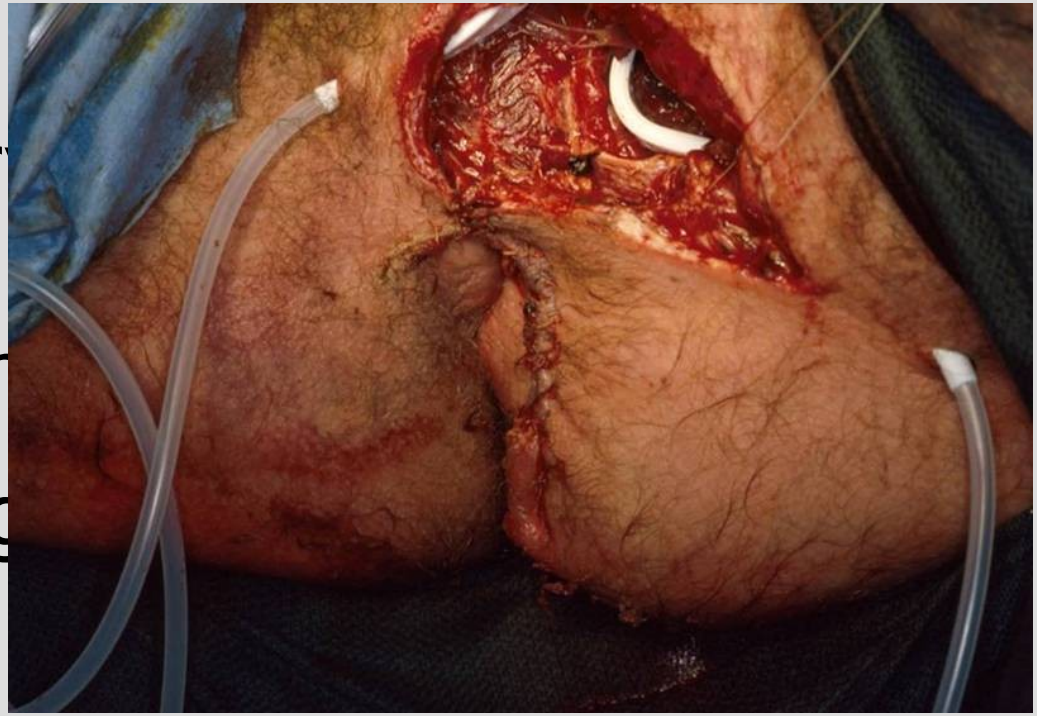
- Mobilize colon
- Simple, isolated colon injuries (ie. stabwound)
  - Debride wound
  - Perform margins primary repair
  - Edges to normal, noncontused tissue
- Segmental damage from high energy weapons
  - Segmental resection
  - Colostomy
    - » If unstable, delay colostomy maturation
- Gross contamination requires thorough high volume abdominal washout >5L

Rectal Injury

- Evaluate with proctoscopy
- Treatment
  - Diversion
  - Debridement & primary closure if possible
  - Distal Washout
- Do not create new drainage tracts

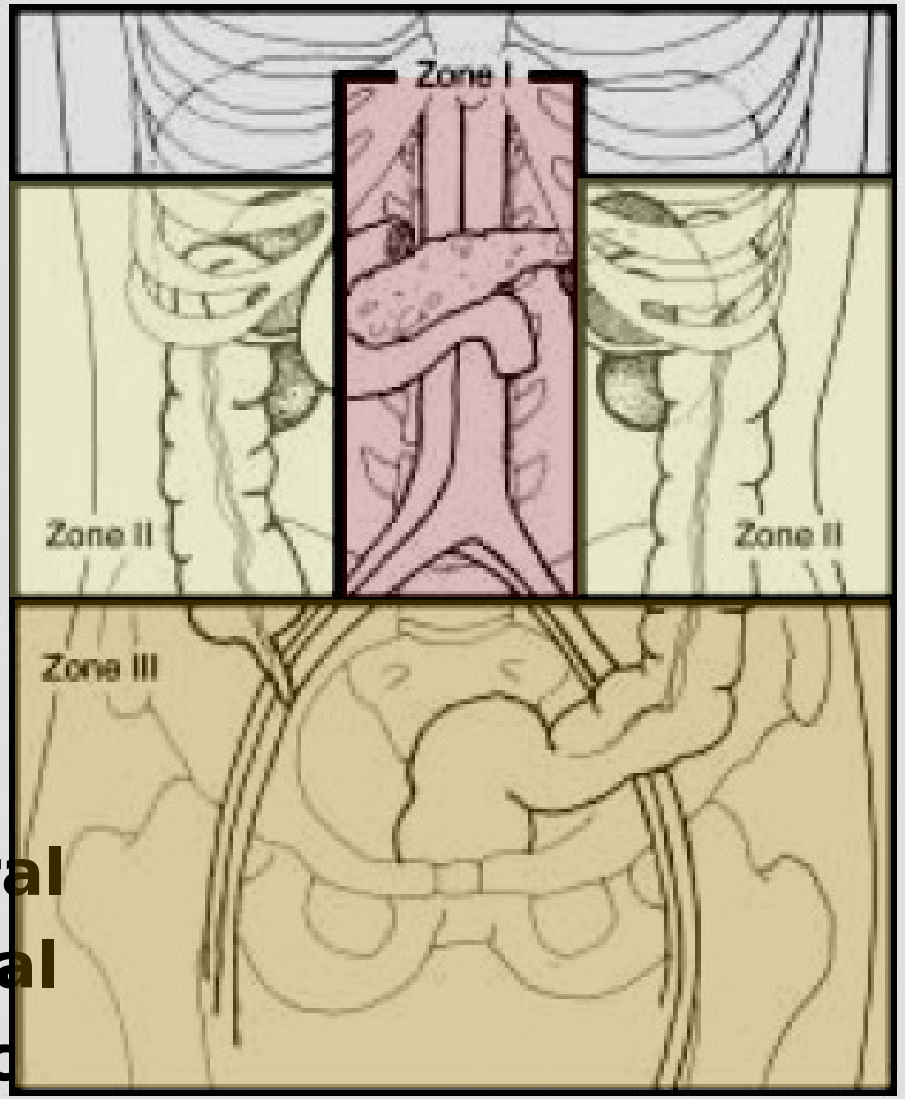
Anal Injury

- No sphincter involvement
  - Observe
- Sphincter injur
  - Tag
  - Delayed repair
- Exsanguinating perianal injury
  - Pack



Retroperitoneal Injury

- Explore all centra
  & all penetrating
  retroperitoneal
  hematomas

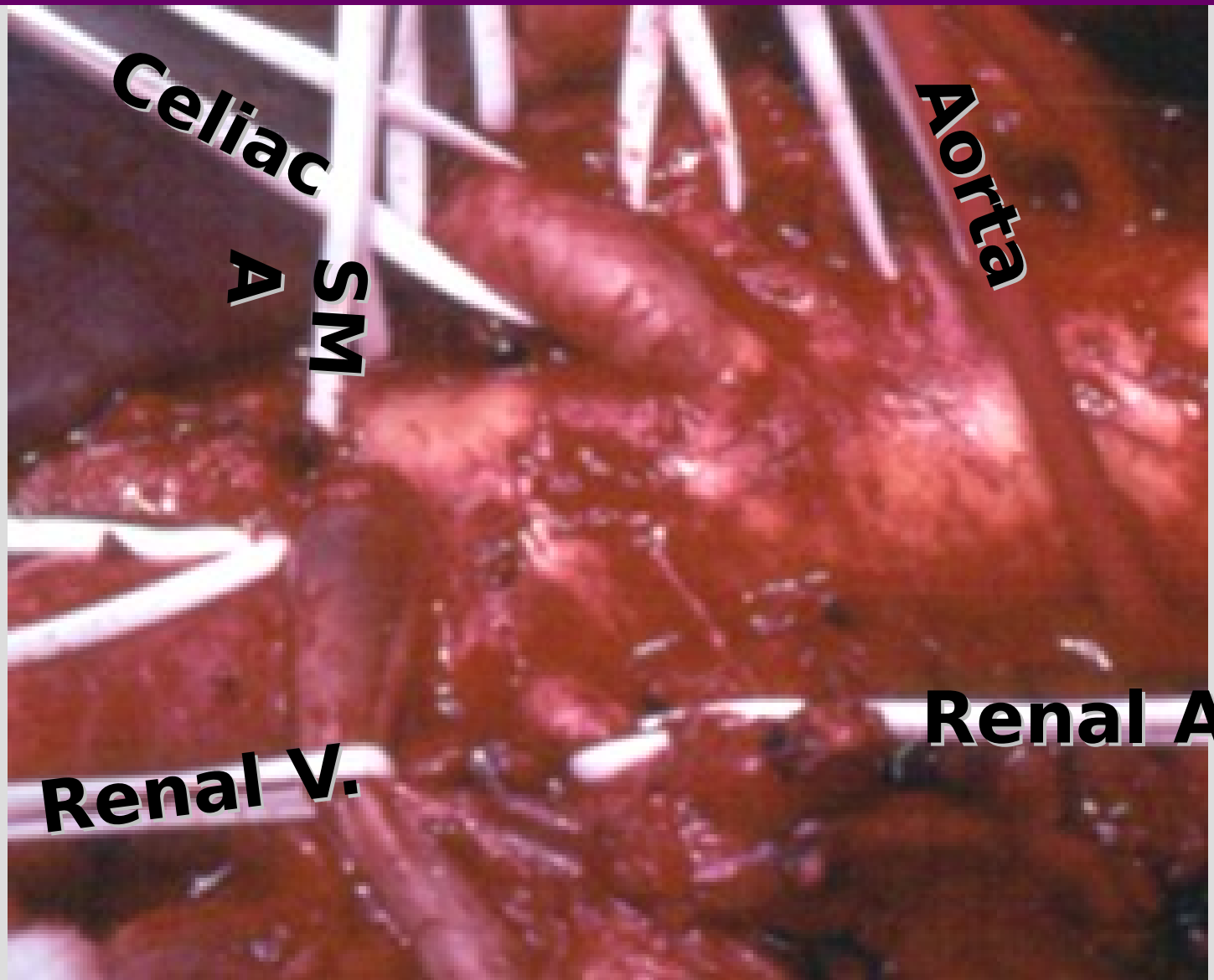


I - Central

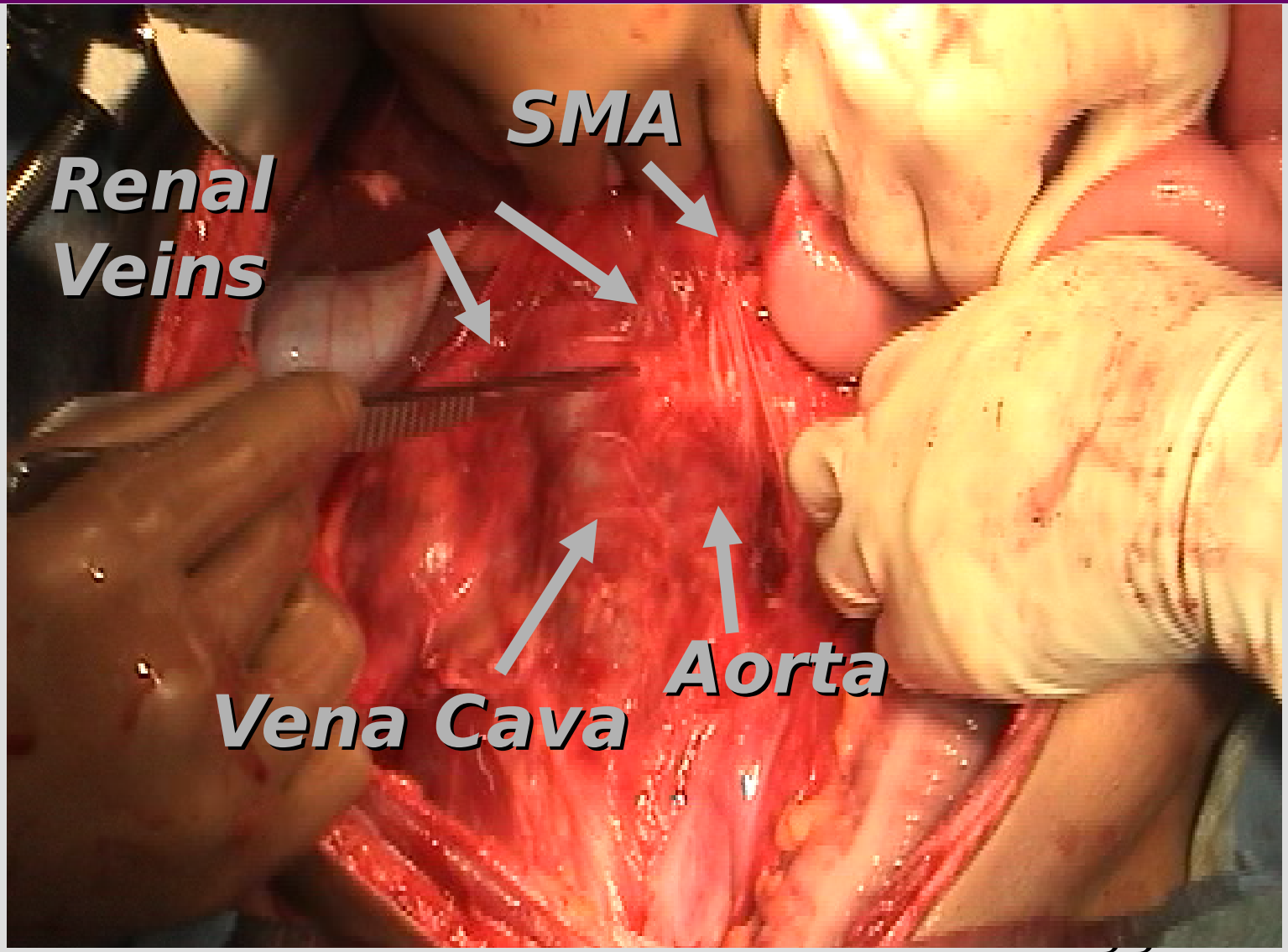
II - Lateral

III - Pelvic

Left Medial Visceral Rotation



Right Medial Visceral Rotation

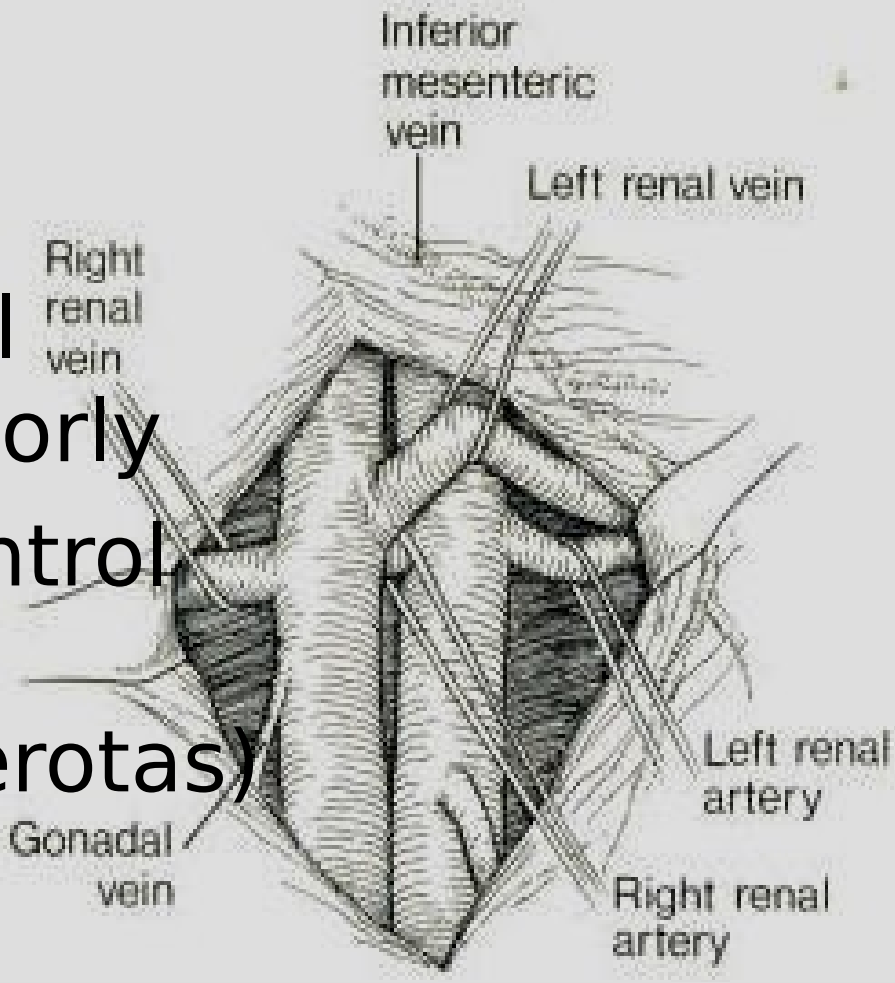


GU: Renal Injuries

- Blunt: nonoperative management
- Penetrating: explore
  - Define presence of functioning non-injure kidney
- Single shot IVP
  - 2 cc/kg un-diluted renografin
  - KUB in 10 min

Renal Exposure

- Mobilize right or left colon
- Retract small bowel laterally and superiorly
- Obtain vascular control prior to opening perirenal fascia (Derotas)



Renal Injury

- Goals
  - Hemorrhage control
  - Collecting system continuity
- Unstable patient with renal hemorrhage
  - Nephrectomy

Renal Salvage Options

- Stable with renal paranchymal injury
- Attempt salvage
- Collecting system involved
  - Pledgeded repair
  - Partial nephrectomy

ed
ular repair

Ureteral Injury

- Identify & localize with indigo carmine
- Repair
  - Minimal debridement
  - 1 cm spatulated anastomc
  - Interrupted, absorbable 4/5-0 suture
  - Internal stent
  - External drainage
- Damage control option
  - Tube urostomy

GU: Bladder Injuries

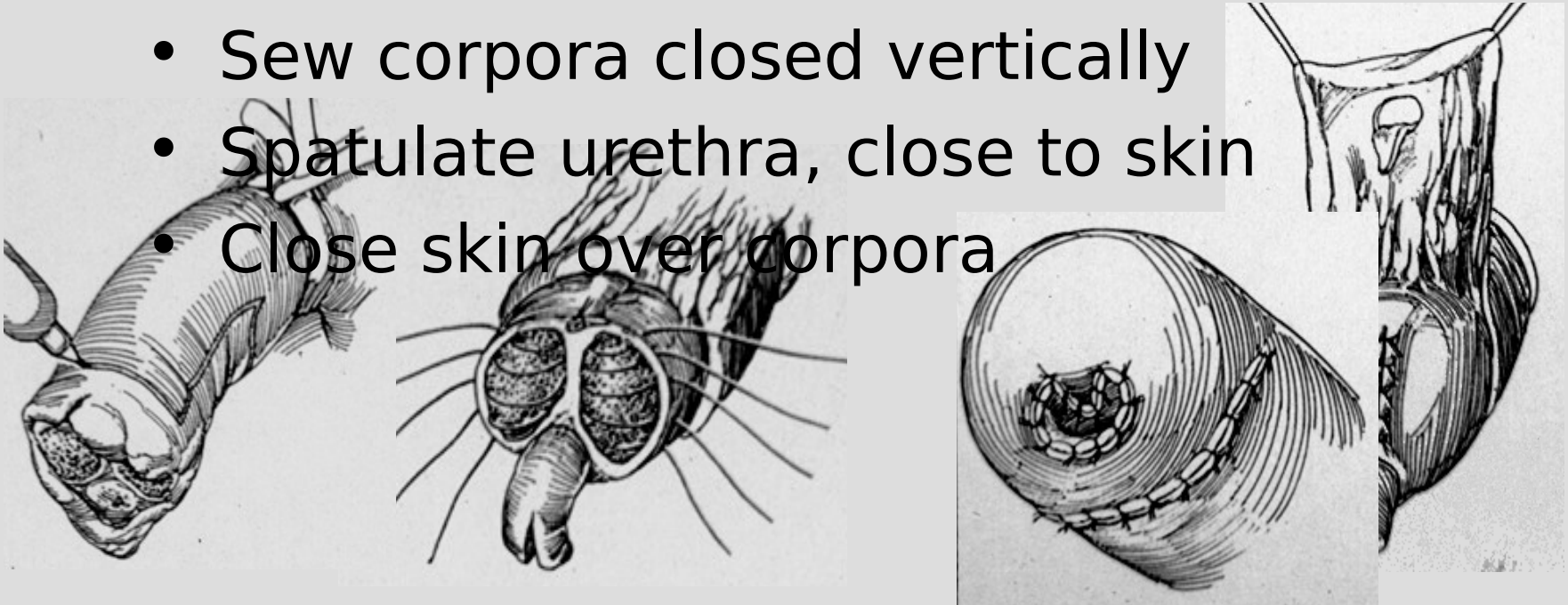
- Intra-peritoneal injury
  - Primary repair & drainage
  - Watertight, 2 - layer absorbable closure
- Extra-peritoneal injury
  - Bladder drainage

GU: Urethral Injury

- If suspected
  - Perform retrograde urethrogram
- Attempt 1 gentle Foley pass
  - If unsuccessful perform suprapubic tube
  - Leave tube for 10-14 day

Penile Injuries - Amputation

- Microsurgical repair
  - If amputated portion intact
- If not:
  - Cut corpora 1 cm shorter than urethra
  - Sew corpora closed vertically
  - Spatulate urethra, close to skin
  - Close skin over corpora



GU: Scrotal injury

- Testicle
  - Explore & close tunica
  - If non-viable, orchiectomy

- Scrotum
  - Debride and primarily close scrotal lacerations
  - 3-0 absorbable suture, 2-layers, < 8 hours
- Loss of scrotum: place viable testicle in medial thigh pocket

GYN Injuries

- Expanding vaginal/vulvar hematoma
  - Incise and drain
  - Ligate & pack
- Uterine injury
  - Hemorrhage not responding to ligation/extensive cervical damage: hysterectomy
  - Uterine wall/cervical laceration closed with absorbable suture

Abdominal Injury

Questions?

SUMMARY - Abdominal Injuries

- Indications for laparotomy on the battlefield
- Use of FAST exam in the evaluation of the combat casualty
- Management of injuries to the GI tract, GU tract, abdominal solid organs & abdominal vasculature